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| 09/895,787      | 06/30/2001  | Gurer Emir           | 8003-390            | 7334             |

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EXAMINER

GILLIAM, BARBARA LEE

ART UNIT PAPER NUMBER

1752

DATE MAILED: 01/16/2003

9

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/895,787

Applicant(s)

EMIR ET AL.

Examiner

Barbara Gilliam

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on IDS filed 1/6/03.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5, 8.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Oath/Declaration***

1. Applicant is request to check the inventorship of the present application. There is a discrepancy with the following inventor names: Gruer Emir and Ted C. Bettes. Both inventors are common to US Patent No. 6,238,735, however the inventors listed therein include Emir Gruer and Ted C. Dettes.

### ***Priority***

2. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 120 as follows: This application is claiming the benefit of prior filed nonprovisional applications under 35 U.S.C. 120, 121, or 365(c).

a. The present application is not entitled to the filing date of Application No. 09/745,611, because the present claims are not supported by the disclosure of Application No. 09/745,611. Specifically there is no reference to control the solvent vapor concentration of the control gas to be greater than approximately 50% of the saturated value.

b. The present application is not entitled to the filing date of Application No. 09/795,924, because the present claims are not supported by the disclosure of Application No. 09/795,924. Specifically there is no reference to control the solvent vapor concentration of the control gas to be greater than approximately 50% of the saturated value.

c. The present application is not entitled to the filing date of Application No. 09/391964 (US 6,238,725), because the application issued on May 29, 2001 which is

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prior to the filing date of the present application, June, 30, 2001. Copendency between the current application and the prior application is required.

3. Please refer to MPEP 2133.01: "When applicant files a continuation-in-part whose claims are not supported by the parent application, the effective filing date is the filing date of the child CIP. Any prior art disclosing the invention or an obvious variant thereof having a critical reference date more than 1 year prior to the filing date of the child will bar the issuance of a patent under 35 U.S.C. 102(b). *Paperless Accounting v. Bay Area Rapid Transit System*, 804 F.2d 659, 665, 231 USPQ 649, 653 (Fed. Cir. 1986)."

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 32 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim 32 recites the limitation "humid gas" in claim 1. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1, 14, 18, 22, 26, 30-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mandal et al in view of Takeshita et al.

a. In US Patent No. 6,238,735, Mandal et al teach a method of uniformly coating a substrate with a polymer solution to produce a film of uniform thickness which includes mounting the substrate inside an enclosed housing and passing a control gas, which may be solvent vapor bearing gas into the housing through an inlet. The polymer solution is deposited onto the surface of the substrate in the housing and the substrate is then spun. The control gas and any solvent vapor and particulate contaminants suspended in the control gas are exhausted from the housing through an outlet and the solvent vapor concentration is controlled by controlling the temperature of the housing and the solvent from which the solvent vapor-bearing gas is produced. Instead the concentration can be controlled by mixing gases having different solvent concentrations. The humidity of the gas may also be controlled (abstract & claim 1). The method of Mandal et al can further comprise a step of passing solvent-free, humid gas over the coated substrate (claim 6). The humidity of the humid gas is controlled by means of a temperature and humidity controller (claim 7). The humidity of the humid gas is controlled to have the relative humidity in the range of 40% to 45% (claim 8). The

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temperature of the humid gas is controlled by means of a temperature and humidity controller (claim 9). The depositing means can include a dispensing head means mounted above the chuck for dispensing a stream of the polymer solution onto the surface of the substrate, the dispensing head means being moveable relative to the substrate. If the substrate has a substantially circular shape the dispensing head means is typically moveable substantially radially across the surface of the substrate (column 2, line 66 – column 3, line 3).

b. Mandal et al clearly teach controlling the solvent vapor concentration by controlling the temperature of the housing and the solvent from which the solvent vapor-bearing gas is produced or by mixing gases having different solvent concentrations (abstract). However, Mandal et al is not specific with respect to the desired concentration of the solvent vapor. In US Patent No. 6,248,168, Takeshita et al teach a spin coating apparatus including aging unit and replacement unit. According to Takeshita et al, it is preferable to have an average concentration of the solvent of the gas being exposed to the substrate corresponding to the saturated vapor pressure at the substrate temperature. The reason is that there is a problem when the average concentration of the solvent of the gas is lower than the saturated vapor pressure, the solvent volatilizes from the coated film on the substrate, resulting in difficulty of generating pores in the film. On the other hand, when the average concentration of the solvent in the gas is higher than the saturated vapor pressure, there is a problem that the vapor condenses on the substrate or on the wall of the treatment chamber, the condensation on the substrate induces deterioration of the film quality, and the condensation on the wall of the treatment chamber tends to cause contamination of the

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apparatus or re-sticking on the substrate (column 4, line 50 – column 5, line 6).

Therefore, the concentration of the solvent in the gas is preferably 100% which meets the present limitations for a solvent vapor concentration of greater than 50% of the saturated value.

c. Therefore it would have been obvious to one of ordinary skill in the art to uniformly coat a substrate with a polymer solution to produce a film of uniform thickness which includes mounting the substrate inside an enclosed housing and passing a solvent vapor bearing gas into the housing through an inlet, depositing a polymer solution onto the surface of the substrate in the housing and spinning the substrate wherein the solvent vapor concentration is 100% of the saturated value with reasonable expectation of obtaining a thoroughly coated wafer with good film quality and without pores or contamination of the treatment chamber based on the teachings of Mandal et al and Takeshita et al.

9. Claims 2-13, 15-17, 19-21, 23-25, 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mandal et al in view of Takeshita et al as applied to claims 1, 14, 18, 22, 26, 30-32 above, and further in view of Chun et al.

a. As indicated in the previous rejection, Mandal et al teach a method of uniformly coating a substrate with a polymer solution to produce a film of uniform thickness which includes mounting the substrate inside an enclosed housing and passing a solvent vapor bearing gas into the housing through an inlet. The polymer solution is deposited onto the surface of the substrate in the housing and the substrate is then spun. However, Mandal et al is not specific with respect to the coating method. It

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would have been obvious to use a known method wherein a uniform coating is obtained such as the high efficiency photoresist coating method taught by Chun et al.

b. In US Patent No. 6,191,053, Chun et al teach a method and apparatus for coating semiconductor substrates with organic photoresist polymers by extruding a ribbon of photoresist in a spiral pattern which covers the entire top surface of the wafer. In this method a wafer is mounted on a chuck, aligned horizontally and oriented upward. An extrusion head is positioned adjacent to the outer edge of the wafer and above the top surface of the wafer with an extrusion slot aligned radially with respect to the wafer. The wafer is rotated and the extrusion head moved radially toward the center of the wafer while photoresist is extruded out the extrusion slot. The rotation rate of the wafer and the radial speed of the extrusion head are controlled so that the tangential velocity of the extrusion head with respect to the wafer is a constant (abstract).

c. Therefore it would have been obvious to one of ordinary skill in the art to uniformly coat a substrate with a polymer solution to produce a film of uniform thickness which includes mounting a substrate wafer inside an enclosed housing, passing a solvent vapor bearing gas into the housing through an inlet and coating the substrate by positioning an extrusion head adjacent to the outer edge of the wafer and above the top surface of the wafer with an extrusion slot aligned radially with respect to the wafer, rotating the wafer and radially moving the extrusion head toward the center of the wafer while extruding photoresist out the extrusion slot wherein the rotation rate of the wafer and the radial speed of the extrusion head are controlled so that the tangential velocity of the extrusion head with respect to the wafer is a constant based on the teachings of Chun et al (column 2, lines 38-45).



***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. In US Patent Application No. 2002/0150691, Kitano et al teach a substrate processing method and substrate processing system.

b. In US Patent Application No. 2002/0127334, Gurer et al teach a method of uniformly coating a substrate.

c. In US Patent Application No. 2001/0017103, Takeshita et al teach a method of coating film, coating unit, aging unit, solvent replacement unit, an apparatus for coating film.

d. In US Patent Application No. 2001/0033895, Minami et al teach a film forming method and film forming apparatus.

e. In US Patent No. 6,468,951, Grieger et al teach a cleaning composition containing tetraalkylammonium salt and use thereof in semiconductor fabrication.

f. In US Patent Nos. 6,407,009, 6,387,825 and 6,317,642, You et al teach methods, compositions and apparatus for spin-on films.

g. In US Patent No. 6,027,760, Gurer et al teach photoresist coating process control with solvent vapor sensor.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Barbara Gilliam whose telephone number is 703-305-1330. The examiner can normally be reached on Monday through Thursday.

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a. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Janet Baxter can be reached on 703-308-2303. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

b. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

*B. Gilliam*

B. Gilliam  
January 10, 2003

*[Signature]*  
JANET BAXTER  
SUPERVISOR, PATENT EXAMINER  
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